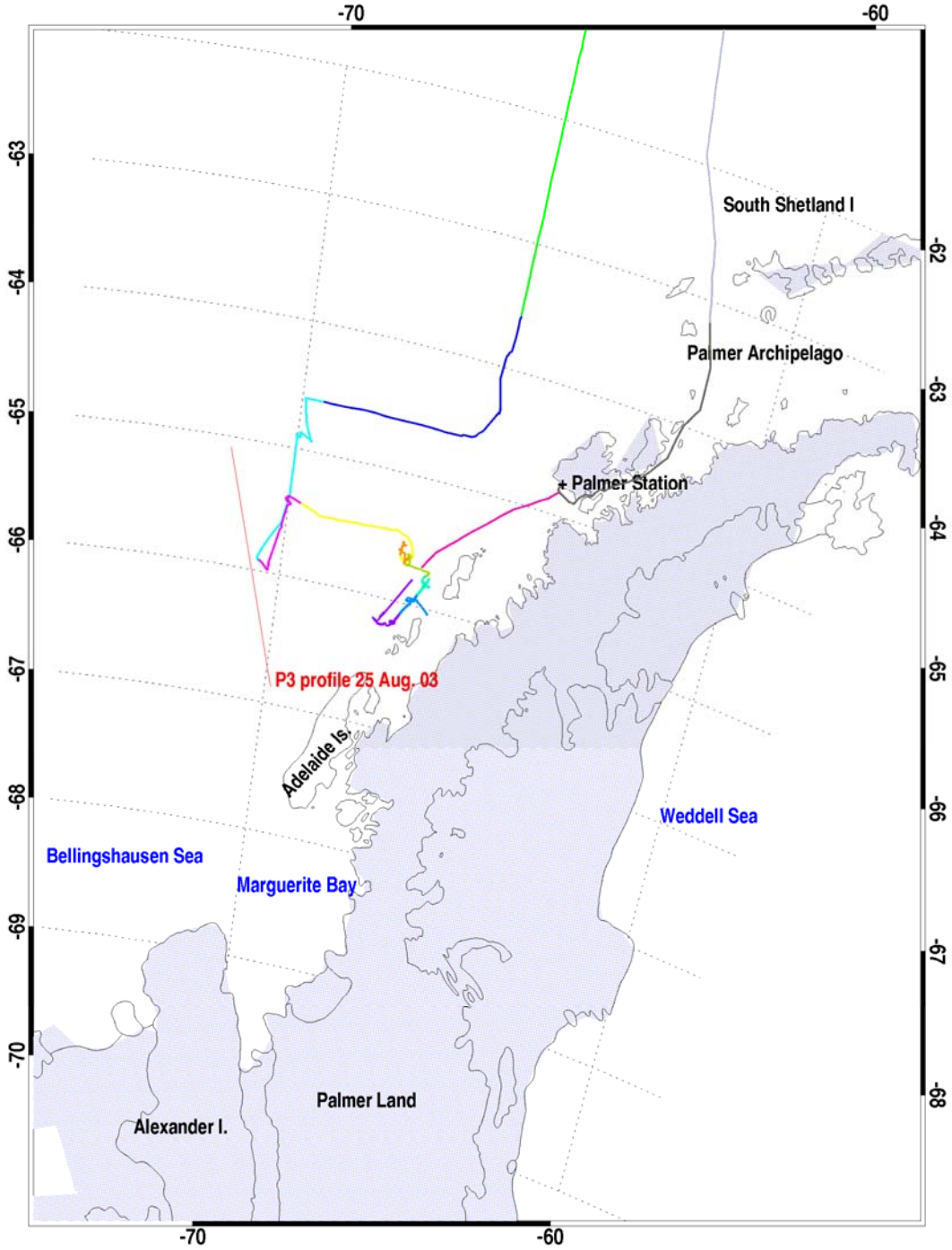
In Situ Sea Ice Studies in the Bellinghausen Sea

AMSR Validation along ship track during August-September 2003

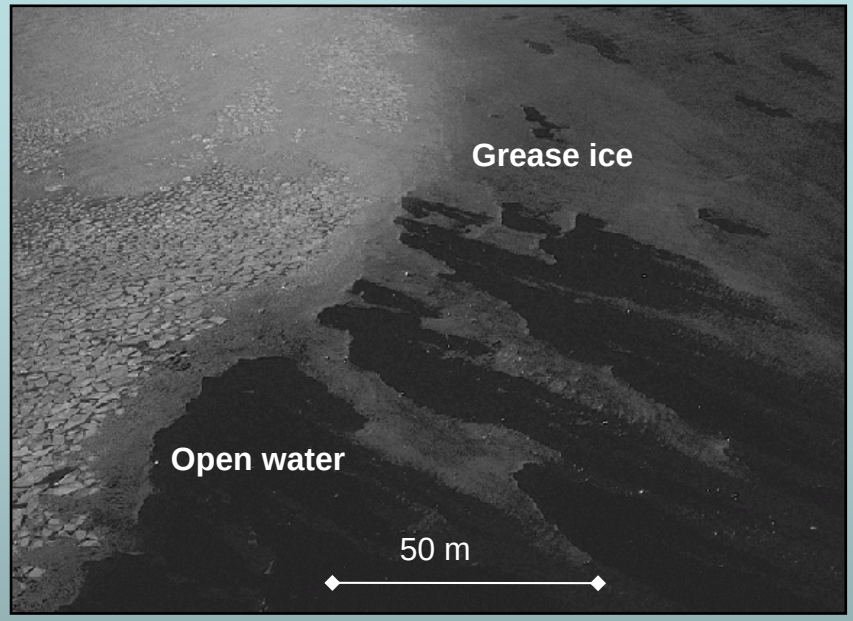
Ship cruise and ice types
In situ ice property measurements
Passive microwave radiometer
Auxiliary measurements

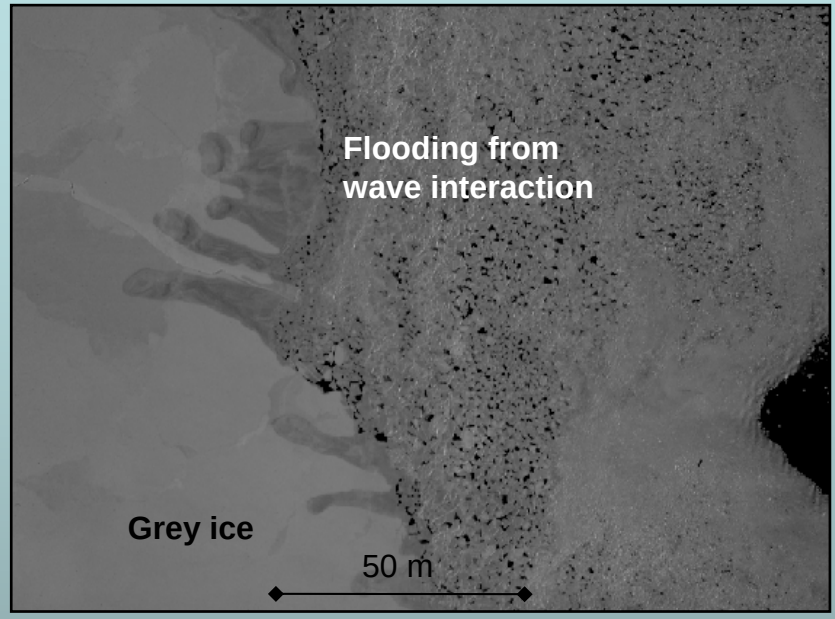
Konrad Steffen, Nicolas Cullen, Russell Huff
CIRES, University of Colorado

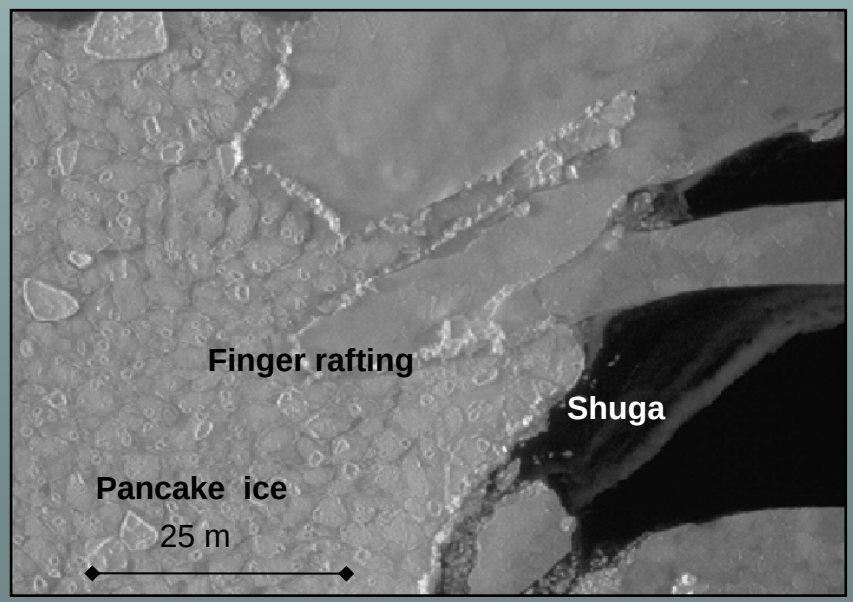
5200 km ship cruise

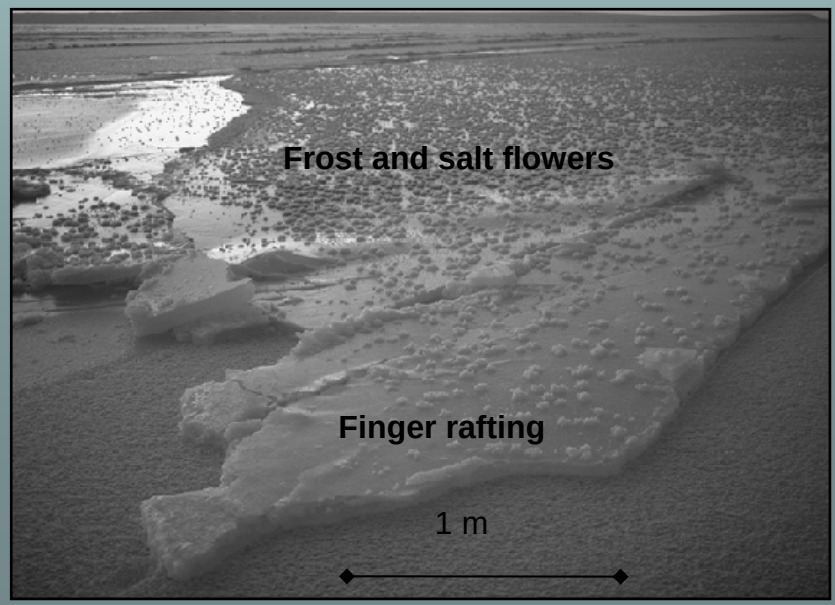

-70
-60
-63
-64
-65
-66
-67
-68
-69
-70
South Shetland I
Palmer Archipelago
+ Palmer Station
P3 profile 25 Aug. 03
Adelaide Is.
Weddell Sea
Bellingshausen Sea
Marguerite Bay
Palmer Land
Alexander I.

Expected young ice types for the Southern Ocean



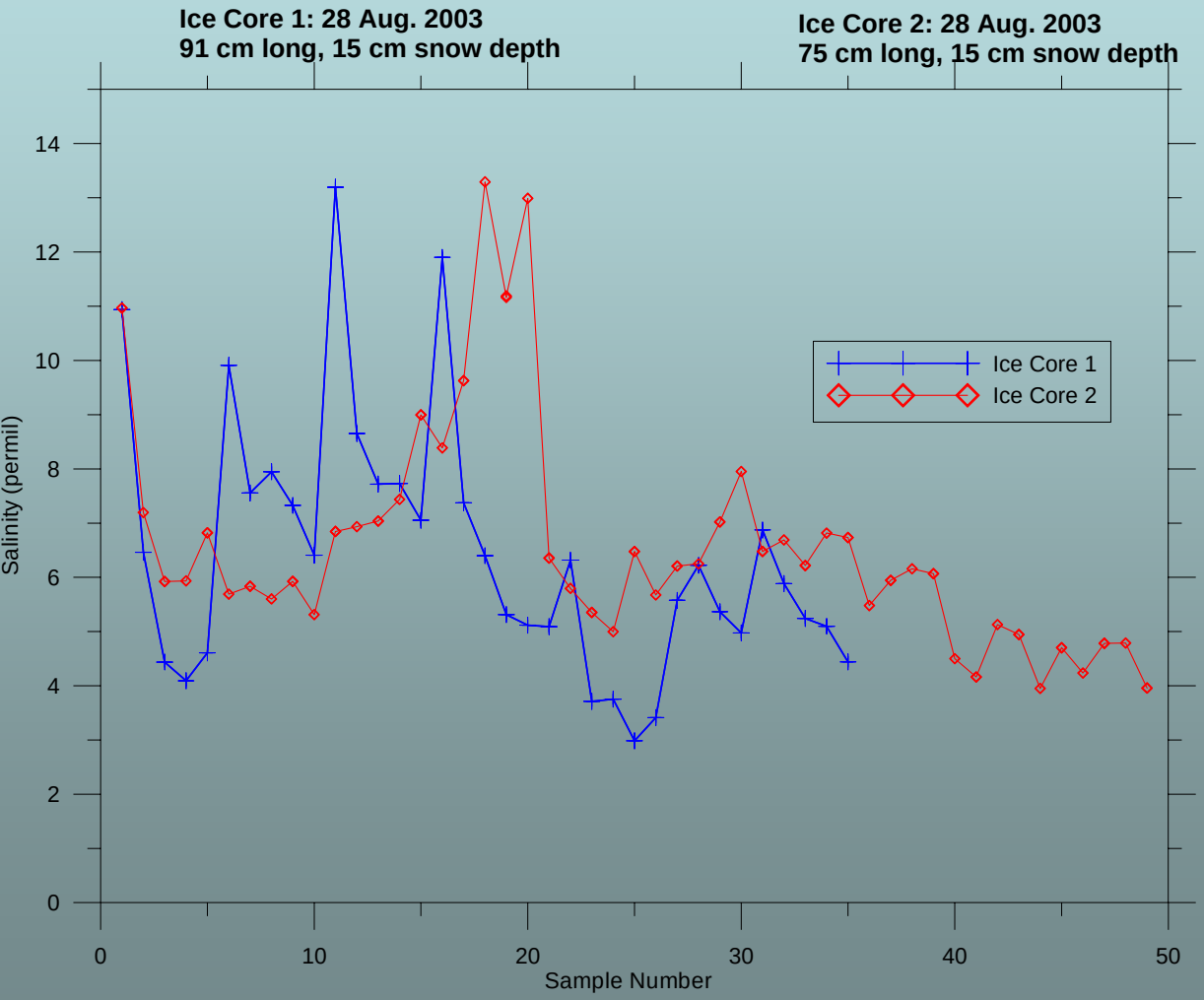




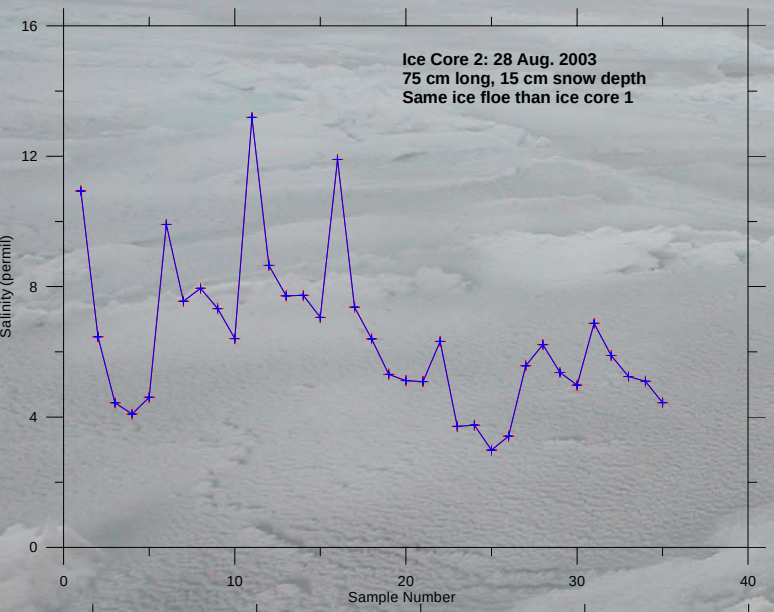


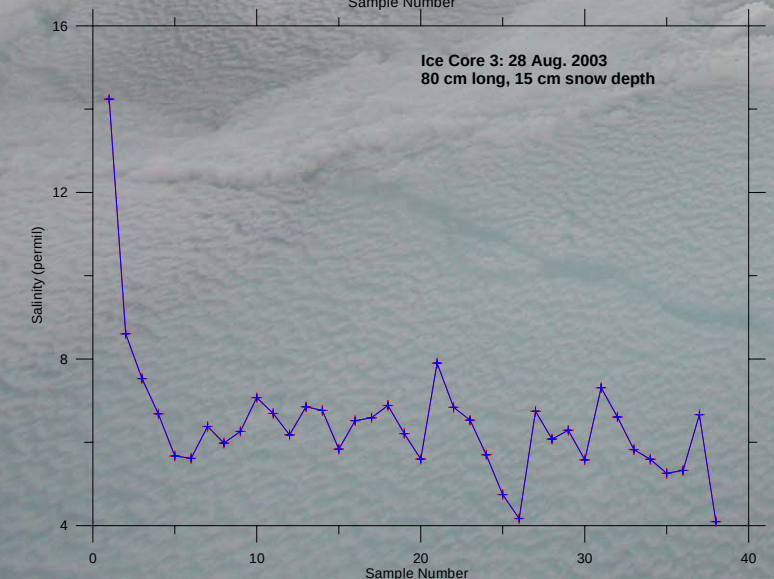
Ice thickness measurements

Salinity and Ice Thickness

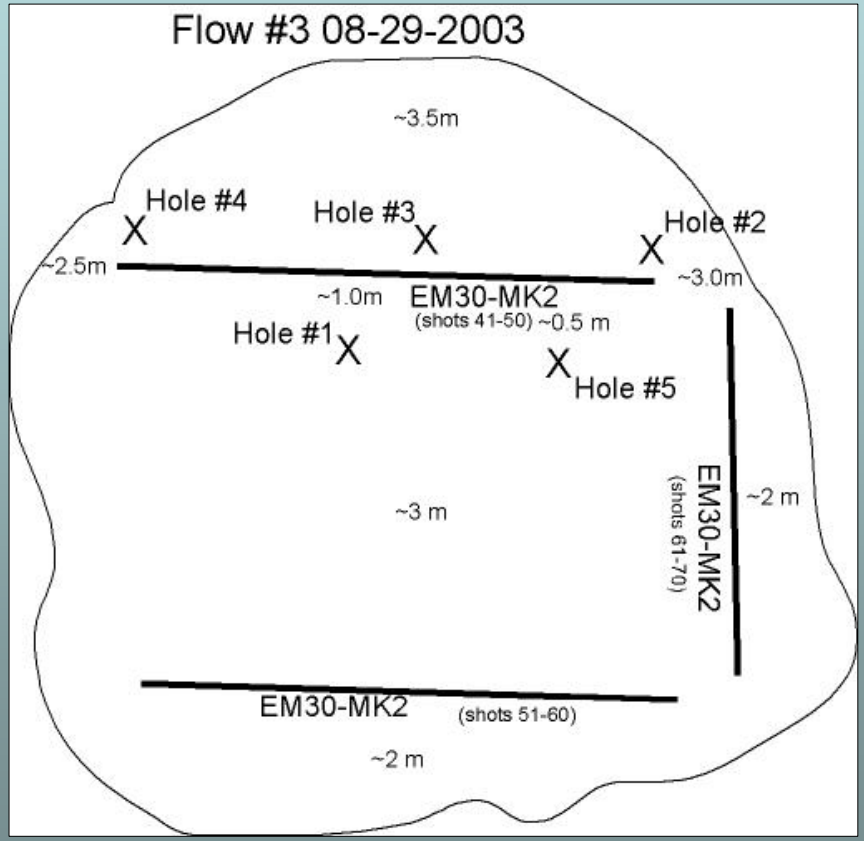


Salinity and Ice Thickness





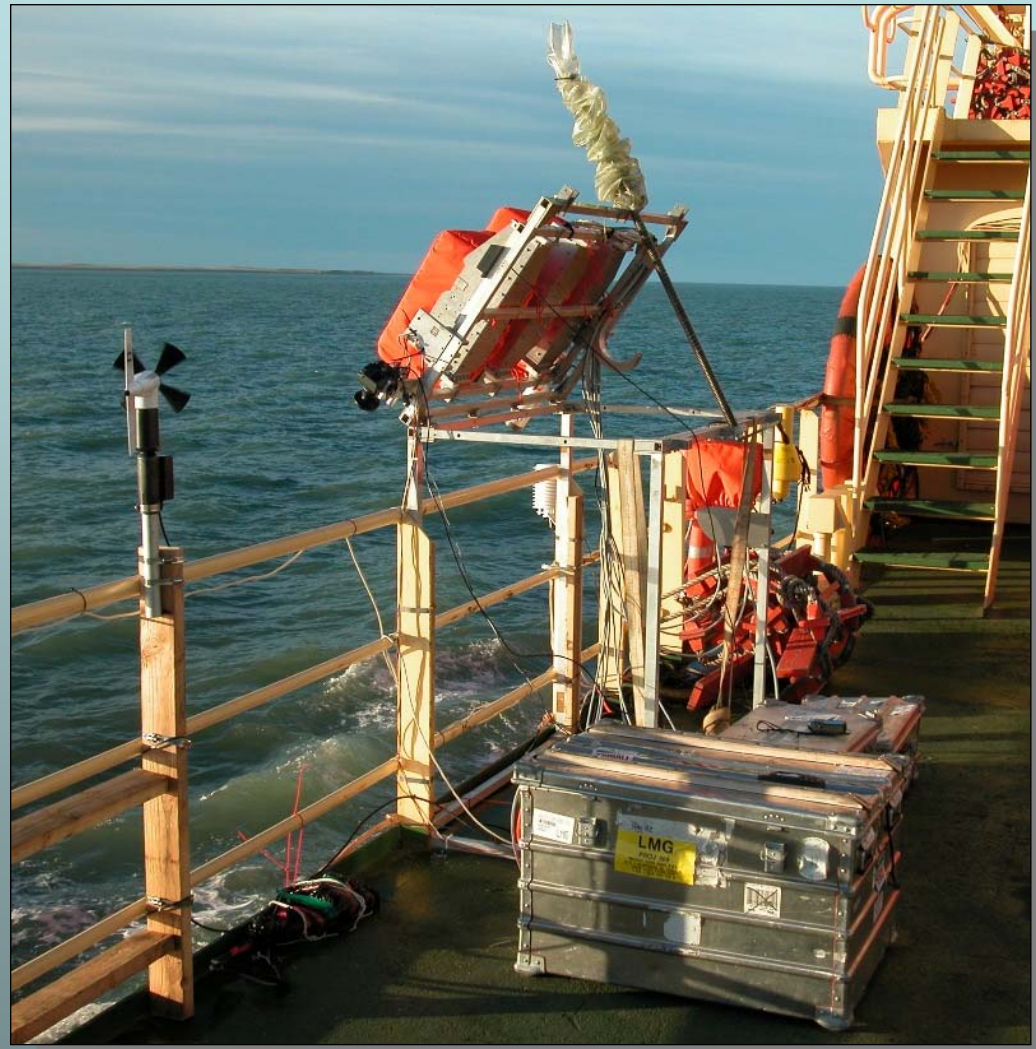
EM30 Ice Thickness Validation



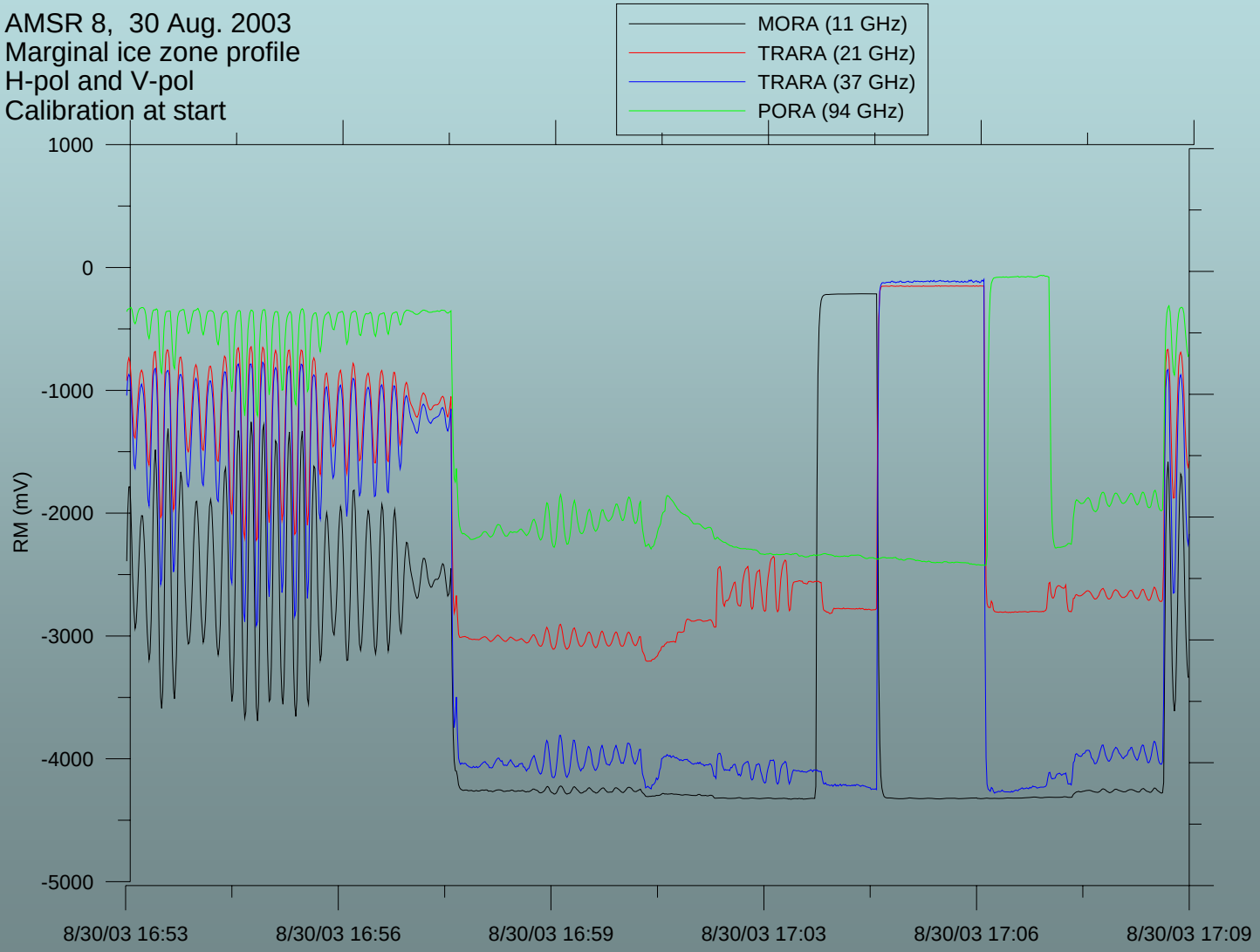
Passive Microwave Radiometers

HIRA: 94 GHz H/V
MIRA: 48 GHz H/V
TRATA: 21 GHz and 35 GHz H/V
MORA: 11 GHZ H/V

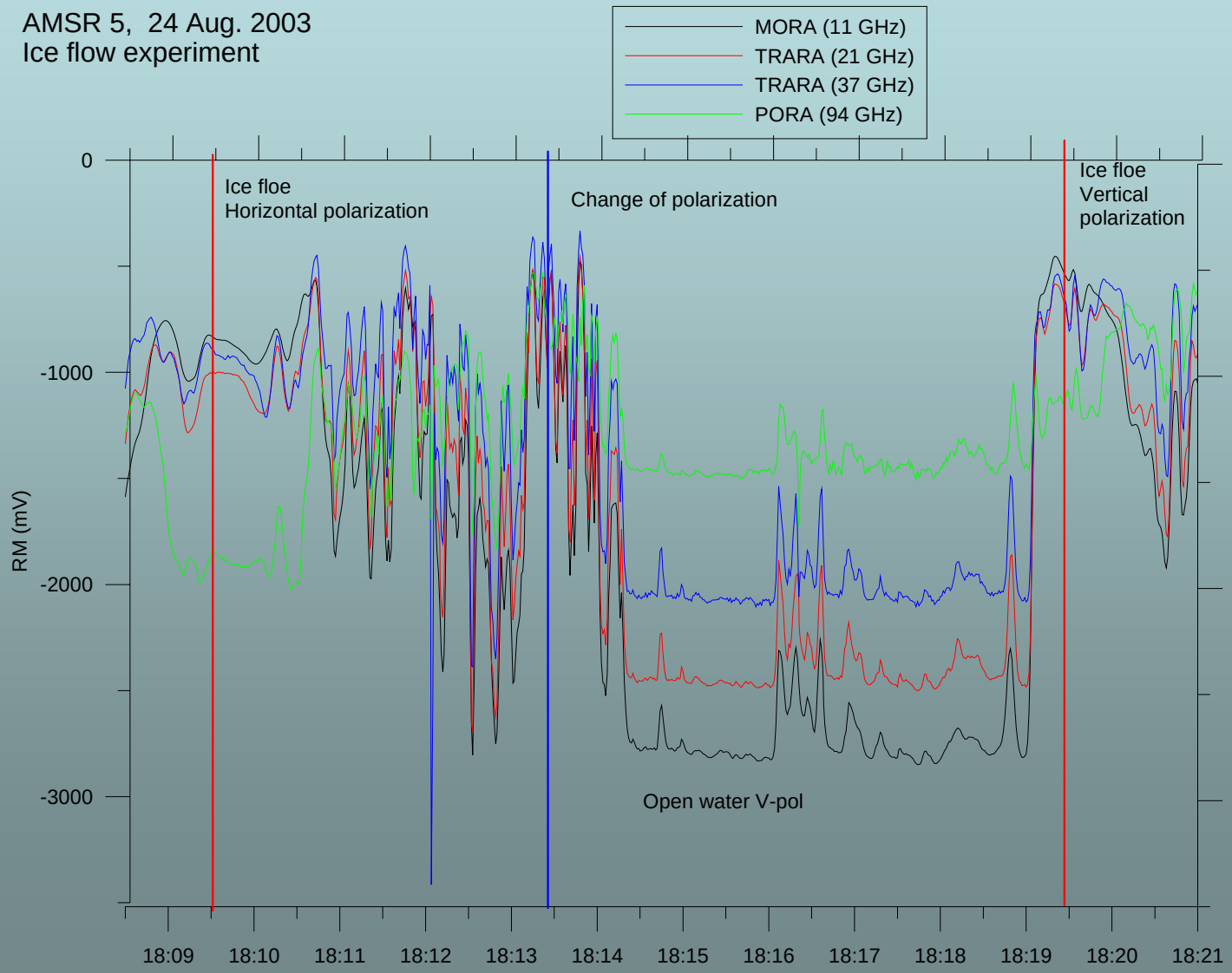
- The instruments need to be rotated for H and V readings
- Profile measurements of various ice types along the ship path
- Atmospheric path length measurements at 0° , 30°, 45° and 60° zenith
- Ice surface temperature profiles measurements with precision radiation instrument



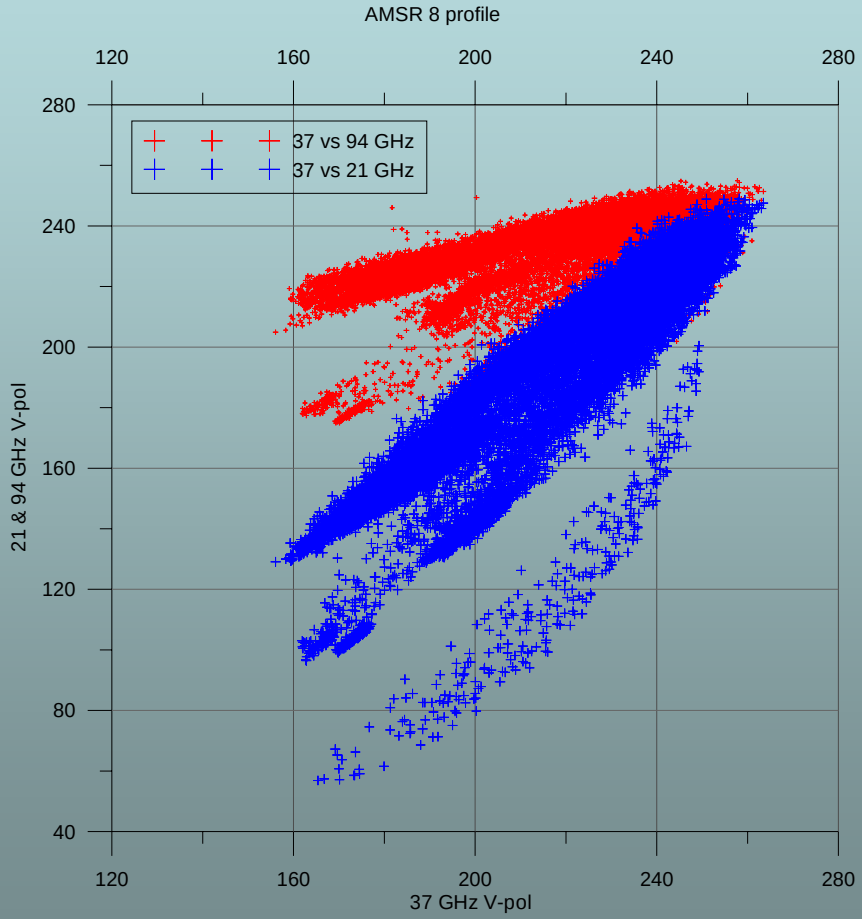
Passive Microwave Calibration

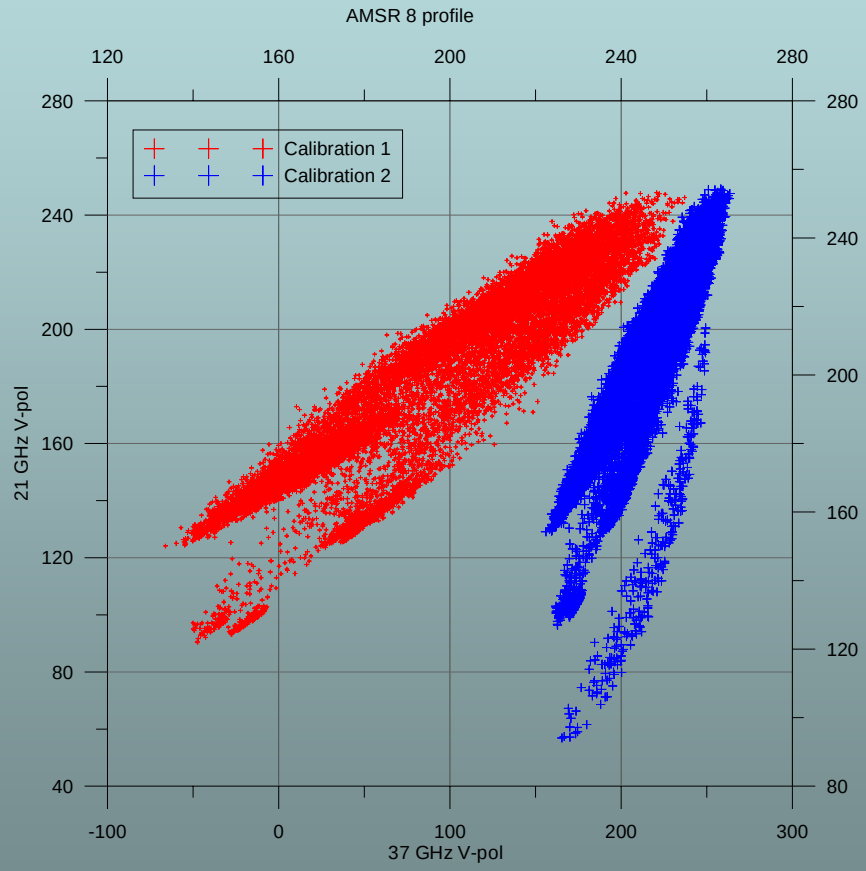


Passive Microwave Raw Data



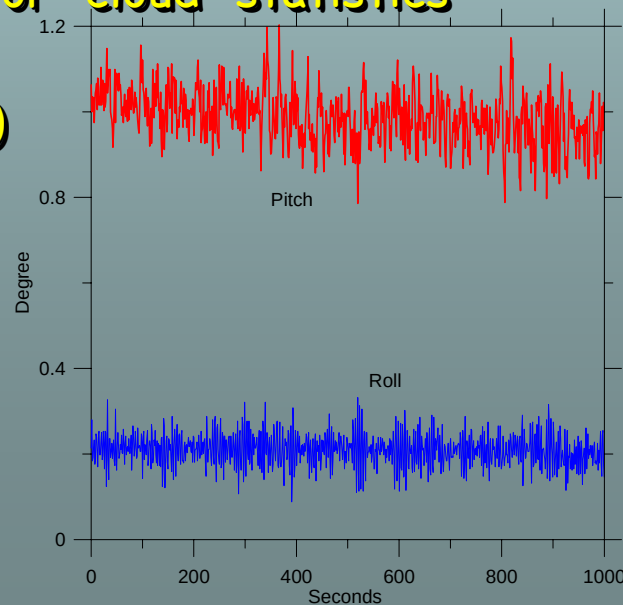
Passive Microwave Ice Signatures





Auxiliary Measurements

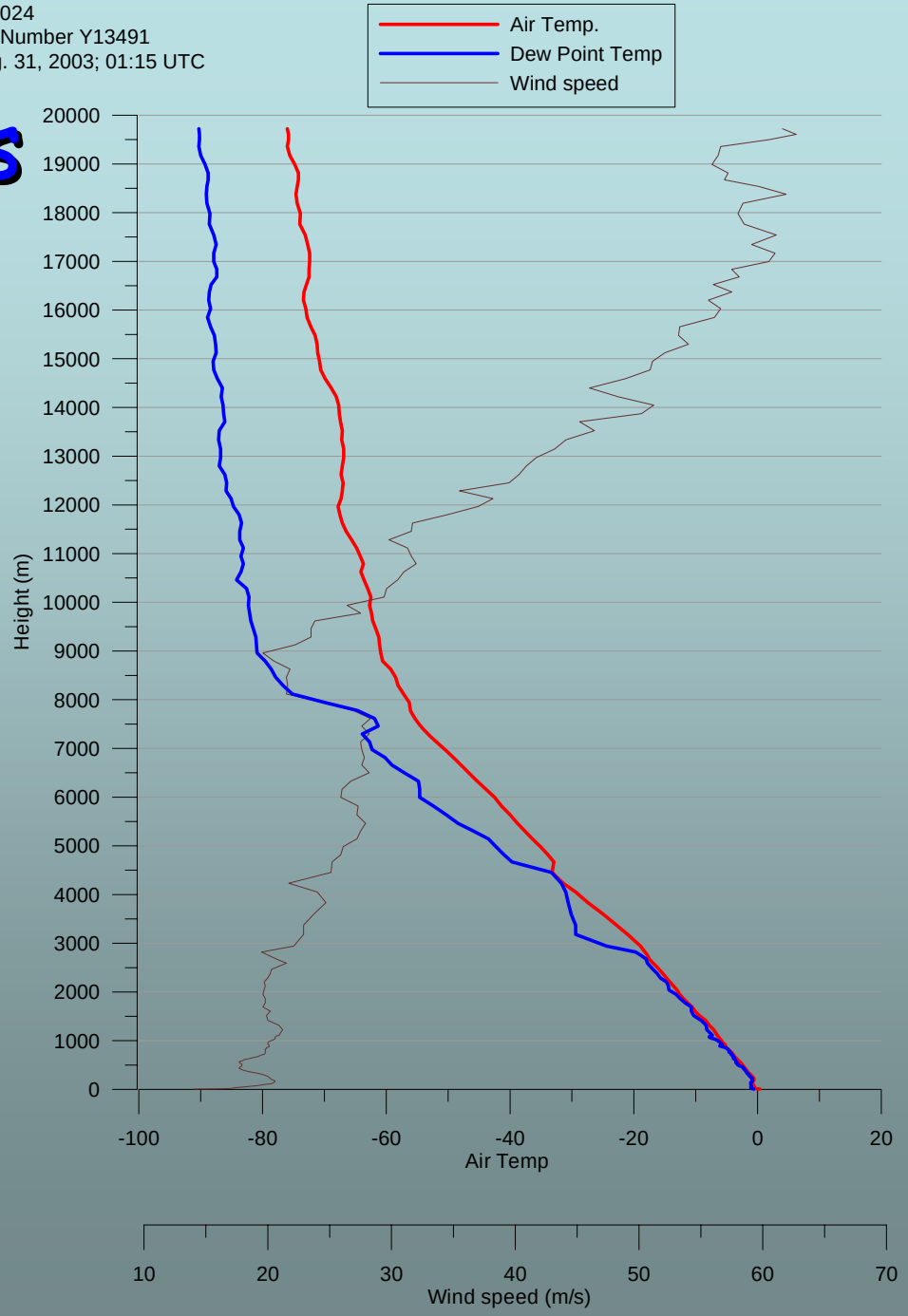
- Radiosond profiles of temperature, humidity and wind speed (Vaisala) if we can get the instrumentation on loan from the Swiss Federal inst. of Technology (ETH, Zuerich (Prof. A. Ohmura)
- Meteorological measurements of temperature, wind speed and direction, humidity, pressure (Campbell instruments)
- 3-D eddy correlation meas. (sensible and latent heat fluxes) at 20 Hz
- Short and long-wave radiation components of incoming and outgoing fluxes (Kipp & Zonen radiometer)
- All sky camera with hemispheric coverage for cloud statistics (Yankee sky imager)
- Real-time satellite information (SSM/.I, AVHRR)
- Inclinometer (roll & pitch), GPS, and more



Radiosonde Profiles

27 profiles along the cruise track
Record height of 20 km on most launches

RS 024
RS Number Y13491
Aug. 31, 2003; 01:15 UTC



S.W.L.11 TONS